

**Importation of leaves and tips of snow
peas, *Pisum sativum* var.
macrocarpon, from the Dominican
Republic into the United States**

Qualitative, Pathway-Initiated Pest Risk Assessment

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A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) to examine plant pest risks associated with the importation into the United States of **fresh leaves and tips of snow peas (*Pisum sativum* var. *macrocarpon*) grown in Dominican Republic**. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low rather than numerical terms such as probabilities or frequencies. The details of methodology and rating criteria can be found in: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, version 4.0* (USDA, 1995); available from the individual named in the proposed regulations, or on the web site: www.aphis.usda.gov/ppq/bats/bant.

International plant protection organizations, *e.g.*, North American Plant Protection Organization (NAPPO) and International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO), provide guidance for conducting pest risk analyses. The methods used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. Our use of biological and phytosanitary terms conforms with the *NAPPO Compendium of Phytosanitary Terms* (Hopper, 1996) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO, 1996).

The *Guidelines for Pest Risk Analysis* provided by FAO (1996) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and 2 (risk assessment).

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; the assessment is in response to a request for USDA authorization to allow importation of a particular commodity presenting a potential plant pest risk. In this case, the importation of **fresh leaves and tips of snow peas (*Pisum sativum* var. *macrocarpon*) grown in Dominican Republic** is a potential pathway for introduction of plant pests. Regulatory authority for the importation of fruits and vegetables from foreign sources into the U.S. is found in 7 CFR §319.56 .

2. Assessment of Weediness Potential of Peas, *Pisum sativum* var. *macrocarpon*

The results of the weediness screening (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity	
Commodity: <i>Pisum sativum</i> L. var. <i>macrocarpon</i> Ser. (snow pea) (Fabaceae)	
Phase 1: Snow peas are widely cultivated in the United States.	
Phase 2: Is the species listed in:	
<u>NO</u>	<i>Geographical Atlas of World Weeds</i> (Holm et al., 1979)
<u>NO</u>	<i>World's Worst Weeds</i> (Holm et al., 1977)
<u>NO</u>	<i>Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act</i> (Gunn and Ritchie, 1982)
<u>NO</u>	<i>Economically Important Foreign Weeds</i> (Reed, 1977)
<u>NO</u>	Weed Science Society of America list (WSSA, 1989)
<u>NO</u>	Is there any literature reference indicating weediness (e.g., <i>AGRICOLA</i> , <i>CAB</i> , <i>Biological Abstracts</i> , <i>AGRIS</i> ; search on "species name" combined with "weed").
Phase 3: Conclusion: There are no reports at the species level of weedy tendencies in any of the available literature and the plant is grown throughout the United States, commercially and for home use.	

3. Previous Risk Assessments, Current Status, and Pest Interceptions

3a. Decision history for *Pisum sativum*

1924 - Jamaica: Peas pod or shelled permitted entry into Northern Ports.
 1924 - Dominican Republic: Peas pod or shelled permitted entry into Northern Ports.
 1924 - Cuba: Peas (green) enterable into Northern and Southern Ports
 1925 - Virgin Islands: Peas pod or shelled permitted entry into Northern Ports.
 1930 - Barbadoes: Peas pod or shelled permitted entry into Northern Ports.
 1931 - Haiti: Peas pod or shelled permitted entry into Northern and Southern Ports.
 1982 - Dominican Republic: Peas pod or shelled permitted entry into all ports.

3b. Pest interceptions 1985-1997 from Dominican Republic.

<i>Epinotia aporema</i>	<i>Pisum</i> sp.
Gelechiidae, species of	<i>Pisum sativum</i>
<i>Maruca testulalis</i>	<i>Pisum sativum</i>
Noctuidae, species of	<i>Pisum sativum</i>
Pyralidae, species of	<i>Pisum sativum</i>
<i>Spodoptera</i> sp.	<i>Pisum sativum</i>
Tortricidae, species of	<i>Pisum</i> sp.

4. Pest List: Pests Associated with *Pisum* spp.

The pest list in Table 2 was developed after a review of the information sources listed in USDA (1995). The list summarizes information on the distribution of each pest, pest-commodity association, and regulatory history.

Table 2: Pest List - <i>Pisum</i> spp.			
Scientific Name, Classification	Distribution ¹	Comments ²	References
Pathogens			
<i>Alternaria brassicae</i> (Berk.) Sacc. (Fungi Imperfecti: Hyphomycetes)	DO,US	c,o	CPC, 1997
<i>Botryotinia</i> (= <i>Sclerotinia</i>) <i>fuckeliana</i> (de Bary) Whetzel (Discomycetes: Helotiales)	Worldwide	c,o	CMI, 1974b
<i>Cercospora canescens</i> Ellis & Martin (Fungi Imperfecti: Hyphomycetes)	DO,US	c,k,o	Chupp, 1953; FAO, 1989
<i>Cercospora pisi-sativae</i> J.A. Stevenson (Fungi Imperfecti: Hyphomycetes)	DO,US	o	Chupp, 1953; Farr <i>et al.</i> , 1989
<i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc. in Penz. (Fungi Imperfecti: Coelomycetes)	DO,US	c,o	CMI, 1971; FAO, 1989; Farr <i>et al.</i> , 1989
<i>Entyloma</i> sp. (Basidiomycetes: Ustilaginales)	DO	k	FAO, 1989
<i>Erysiphe pisi</i> D.C. (Pyrenomycetes: Erysiphales)	Worldwide ₃	o	CMI, 1967

<i>Erysiphe polygoni</i> D.C. (Pyrenomyces: Erysiphales)	DO,US	c,o	Ciferri, 1961; CMI, 1976
<i>Fusarium oxysporum</i> Schlechtend.:Fr. f.sp. <i>pisi</i> (J.C. Hall) W. C. Snyder and Hanna (Fungi Imperfecti: Hyphomycetes)	Worldwide	o	IMI, 1996
<i>Macrophomina phaseolina</i> (Tassi) Goidanich (Fungi Imperfecti: Coelomycetes)	DO,US	c,o	CMI, 1985; CPC, 1997
<i>Mycosphaerella pinodes</i> (Berk. & Blox.) Vesterg. (Loculoascomycetes: Dothideales) Anamorph: <i>Ascochyta pinodes</i> L.K. Jones	DO,US	c,o	CMI, 1979, Hagedorn, 1984
<i>Mycovellosiella phaseoli</i> (Drummond) Deighton (Fungi Imperfecti: Hyphomycetes)	DO	k	FAO, 1989
<i>Phomopsis pisicola</i> Petr. & Cif. (Fungi Imperfecti: Coelomycetes)	DO	z	Ciferri, 1961
<i>Sclerotium rolfsii</i> Sacc. (Agonomycetes)	DO,US	c,m,o	FAO, 1989; Farr <i>et al.</i> , 1989
<i>Septoria papilionacearum</i> Cif. & Frag. (Fungi Imperfecti: Coelomycetes)	DO	z	Ciferri, 1961; Watson, 1971
<i>Thanatephorus cucumeris</i> (A.B. Frank) Donk (Basidiomycetes: Tulasnellales)	DO,US	c,o	CMI, 1974a; FAO, 1989
<i>Uromyces appendiculatus</i> (Pers.:Pers.)Unger (Basidiomycetes: Uredinales)	DO,US	c,k,o	FAO, 1989; Farr <i>et al.</i> , 1989
<i>Uromyces fabae</i> (Grev.) Fuckel (Basidiomycetes: Uredinales) = <i>U. vicia-fabae</i> (Pers.) Shroter	Worldwide	c,o	CMI, 1965; CMI, 1990; Farr <i>et al.</i> , 1989
Bacteria			
<i>Erwinia carotovora</i> subsp. <i>carotovora</i> (Jones) Bergey	Worldwide	c,o,v	Bradbury, 1986
<i>Pseudomonas solanacearum</i> (Smith) Smith	DO,US	c,o	Bradbury, 1986
<i>Pseudomonas syringae</i> pv. <i>phaseolicola</i> (Burkholder) Young, Dye & Wilkie	DO,US	c,o	Bradbury, 1986
<i>Xanthomonas campestris</i> pv. <i>phaseoli</i> (Smith) Dye	DO,US	c,o	Bradbury, 1986

Viruses			
Alfalfa mosaic alfamovirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Bean common mosaic potyvirus	DO,US	k,o	Brunt <i>et al.</i> , 1996; FAO, 1989
Bean golden mosaic bigeminivirus	DO,US(FL,PR)	k ₄	Blair <i>et al.</i> , 1995; Brunt <i>et al.</i> , 1996
Bean yellow mosaic potyvirus	DO,US	o	CPC, 1997; FAO, 1993
Beet western yellows luteovirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Clover yellow vein potyvirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Cucumber mosaic cucumovirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Lettuce mosaic potyvirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Pea mosaic potyvirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Peanut mottle potyvirus	CNA,US	o	Brunt <i>et al.</i> , 1996
Pea seed-borne mosaic virus	Poss. Worldwide	o	CMI, 1975
Tomato spotted wilt tospovirus	Worldwide	o	Brunt <i>et al.</i> , 1996
Arthropods			
<i>Acalymna bivittatum</i> (Fabricius) (Coleoptera: Chrysomelidae) Syn: <i>Diabrotica bivittata</i> (F.)	DO,US(PR)	k,y	CPC, 1997; FAO, 1989; Martorell, 1976
<i>Ancylostomia stercorea</i> (Zeller) (Lepidoptera: Pyralidae)	DO,US	c,k,o	FAO, 1989; Hodges <i>et al.</i> , 1983
<i>Anticarsia gemmatilis</i> Hubner (Lepidoptera: Noctuidae)	DO,US	c,k,o	CPC, 1997; FAO, 1989; Hodges <i>et al.</i> , 1983
<i>Aphis craccivora</i> Koch (Homoptera: Aphidae)	DO,US	c,o,y	FAO, 1989; Martin and Amaro, 1975
<i>Aphis fabae</i> Scopoli (Homoptera: Aphidae)	DO,US	c,o,y	Blackman and Eastop, 1984; CPC, 1997
<i>Aphis gossypii</i> Glover (Homoptera: Aphidae)	DO,US	c,o,y	Blackman and Eastop, 1984; FAO, 1989; Martin and Amaro, 1975
<i>Bemisia tabaci</i> (Gennadius) (Homoptera: Aleyrodidae)	DO,US	c,o,y ₄	FAO, 1993; Mound and Halsey 1978
<i>Cerotoma ruficornis</i> (Olivier) (Coleoptera: Chrysomelidae)	DO	e,y	FAO, 1989; Martin and Amaro, 1987
<i>Corythucha gossypii</i> (Fabricius) (Heteroptera: Tingidae)	DO	k,	FAO, 1989

<i>Diabrotica balteata</i> LeConte (Coleoptera: Chrysomelidae)	DO,US	c,o,y	FAO, 1989; Granillo <i>et al.</i> , 1975; Martin and Amaro, 1975; Schalk <i>et al.</i> , 1993
<i>Diaphania hyalinata</i> (L.) (Lepidoptera: Pyralidae)	DO,US	c,k,o	FAO, 1989; Webb, 1994; Zhang, 1994
<i>Disonycha eximia</i> Harold (Coleoptera: Chrysomelidae)	DO,US(PR)	k	CPC, 1997; FAO, 1989; Martorell, 1976
<i>Elasmopalpus lignosellus</i> (Zeller) (Lepidoptera: Pyralidae)	DO,US	k,o	CPC, 1997; FAO, 1989
<i>Empoasca fabae</i> (Harris) (Homoptera: Cicadellidae)	DO,US	c,o	CPC, 1997; FAO, 1989
<i>Epitrix fasciata</i> Blatchley (Coleoptera: Chrysomelidae)	DO,US	c,o,z	CIE, 1981; Martin and Amaro, 1975
<i>Etiella zinckenella</i> (Treitschke) (Lepidoptera: Pyralidae)	DO,US	c,o,z	CIE, 1974a; FAO, 1989
<i>Euschistus bifibulus</i> (P. de Beauvois) (Heteroptera: Pentatomidae)	DO,US(PR)	c,k	CPC, 1997; FAO, 1989; Martorell, 1976
<i>Feltia (Agrotis) subterranea</i> (Fabricius) (Lepidoptera: Noctuidae)	DO,US	c,o	FAO, 1989; Hodges <i>et al.</i> , 1983; Zhang, 1994
<i>Ferrisia virgata</i> (Cockerell.) (Homoptera: Pseudococcidae)	DO,US	c,o,z	CIE, 1966; Martin and Amaro, 1975
<i>Gryllus (Acheta) assimilis</i> F. (Orthoptera: Gryllidae)	DO,US	k,o	CPC, 1997; FAO, 1989; Nickle <i>et al.</i> , 1974
<i>Heliothis virescens</i> (F.) (Lepidoptera: Noctuidae)	DO,US	c,o	Hodges <i>et al.</i> , 1989; Marin and Amaro, 1975; Zhang, 1994
<i>Helicoverpa zea</i> Boddie (Lepidoptera: Noctuidae)(Syn: <i>H. obsoleta</i> F.)	DO,US	c,o	EPPO, 1995a; Hodges <i>et al.</i> , 1983; Martin and Amaro, 1975
<i>Herpetogramma (Pachyzancla) bipunctalis</i> (F.) (Lepidoptera: Pyralidae)	DO,US	c,k,o	FAO, 1972; FAO, 1989; Hodges <i>et al.</i> , 1983; Zhang, 1994
<i>Japanagromyza (Agromyza) inaequalis</i> Malloch (Diptera: Agromyzidae)	DO,US(FL,PR)	k,z	FAO, 1989; Spencer, 1973
<i>Liriomyza huidobrensis</i> (Burgess) (Homoptera: Agromyzidae)	DO,US(CA,HI, TX,UT,WA)	h	FAO, 1993; Gary <i>et al.</i> , 1986; Heinz and Chaney, 1995; Malais <i>et al.</i> , 1992; Spencer, 1973
<i>Liriomyza sativae</i> Blanchard (Diptera: Agromyzidae)	DO,US	c,o	CPC, 1997
<i>Liriomyza trifolii</i> (Burgess) (Homoptera: Agromyzidae)	DO,US	c,o	FAO, 1993; EPPO, 1995a

<i>Maruca testulalis</i> (Geyer) (Lepidoptera: Pyralidae)	DO	z	EPPO, 1995a
<i>Mythima(Leucania) unipuncta</i> (Haworth) (Lepidoptera: Noctuidae)	DO,US	k,o	FAO, 1972; FAO, 1989; Zhang, 1994
<i>Myzus persicae</i> Sulzer (Homoptera: Aphidae)	DO,US	c,o,y	Blackman and Eastop, 1984; Brunt <i>et al.</i> , 1996; CPC, 1997
<i>Nezara viridula</i> L. (Heteroptera: Pentatomidae)	DO,US	c,o	CIE, 1970; FAO, 1989; Martin and Amaro, 1975
<i>Omiodes (Hedylepta) indicata</i> Fabricius (Lepidoptera: Pyralidae)	DO,US(PR)	k,z	FAO, 1972; FAO 1989; Martorell, 1976; Zhang, 1994
<i>Phyllophaga hogardi</i> Blanch. (Coleoptera: Scarabaeidae)	DO	k	CPC, 1997; FAO, 1989
<i>Prepodes quadrivittatus</i> Olivier (Coleoptera: Curculionidae)	DO	k	CPC, 1997; FAO, 1972
<i>Pseudoplusia includens</i> (Walker) (Lepidoptera: Noctuidae)	DO,US	c,o	CPC, 1997; FAO, 1989; Hodges <i>et al.</i> , 1983
<i>Spodoptera eridania</i> (Cramer) (Lepidoptera: Noctuidae)	DO,US	c,m,o	FAO, 1989; Hodges <i>et al.</i> , 1983; Zhang, 1994
<i>Spodoptera exigua</i> Hubner (Lepidoptera: Noctuidae)	DO,US	c,o	CPC, 1997; Hodges <i>et al.</i> , 1983; Zhang, 1994
<i>Spodoptera frugiperda</i> (J.E. Smith) (Lepidoptera: Noctuidae)	DO,US	c,m,o	FAO, 1989; Hodges <i>et al.</i> , 1983; Saunders <i>et al.</i> , 1983; Zhang, 1994
<i>Spodoptera ornithogalli</i> (Guenee) (Lepidoptera: Noctuidae)	DO,US	c,o	FAO, 1989; Hodges <i>et al.</i> , 1983; Martin and Amaro, 1975; Zhang, 1994
<i>Spodoptera sunia</i> (Gn.) (Lepidoptera: Noctuidae) (<i>S. albula</i> (Walker))	DO,US	c,o,z	CPC, 1997; Hodges <i>et al.</i> , 1983; Zhang, 1994
<i>Spoladea recurvalis</i> (Fabricius) (Lepidoptera: Pyralidae)	DO,US	c,m,o	FAO, 1989; Hodges <i>et al.</i> , 1983; Zhang, 1994
<i>Systema basalis</i> Duval (Coleoptera: Chrysomelidae)	DO,US(PR)	k,z	CPC, 1997; FAO, 1989; Hodges <i>et al.</i> , 1983
<i>Systema s-littera</i> L. (Coleoptera: Chrysomelidae)	DO,US(PR)	k,l ₃	CPC, 1997; FAO, 1989; Pagan, 1998

<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	DO,US(FL,HI)	n,z	CPC, 1997; FAO, 1993; EPPO, 1995a; EPPO, 1995b; Nakahara, 1991
<i>Thrips tabaci</i> Lindeman (Thysanoptera: Thripidae)	DO,US	c,m,o	CPC, 1997; FAO, 1989; Sheldon and North, 1987
<i>Trichoplusia ni</i> Hubner (Lepidoptera: Pyralidae)	DO,US	c,o	CIE, 1974b; Martin and Amaro, 1975; Zhang, 1994
<i>Urbanus proteus</i> (L.) (Lepidoptera: Hesperidae)	DO,US	c,k,o	FAO, 1989; Hodges <i>et al.</i> , 1983; Zhang, 1994

¹ Distribution legend: DO = Dominican Republic; CNA = Central America; US = United States; CA = California; FL = Florida; HI = Hawaii; ID = Idaho; PR = Puerto Rico; TX = Texas; UT = Utah; WA=Washington

² Comments:

- c = Listed in USDA's non-reportable dictionary as non-actionable.
- e = Although pest attacks commodity, it would not be expected to remain with the commodity during processing.
- h = Quarantine pest: pest has limited distribution in the U.S. and is under official control as follows: (1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest.
- k = Not specifically listed for host, but reported from other hosts in same plant genus/family.
- l = A single unconfirmed report lists this species (with no supporting evidence).
- m = The pest occurs within the country of export and has been reported to attack the specified host species in other geographic regions; but has not been reported to attack the specified host species in the country of export.
- n = Listed in the USDA catalogue of intercepted pests as actionable.
- o = Organism does not meet the geographic or regulatory definition of a quarantine pest.
- v = No specific reports of the pest from the country of export, but regional reports exist and the pest may be present in the country of export.
- y = Pest is a vector of plant pathogens.
- z_e = External pest: is known to attack or infest the commodity, and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.
- z_i = Internal pest: is known to attack or infest the commodity, and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

³ Lionel Pagan, Area Identifier, PPQ, APHIS, USDA in Puerto Rico did not find any reports of this insect in Puerto Rico.

⁴ *Bemisia tabaci* is a vector of Bean golden mosaic bigeminivirus. This virus is reported to occur in Florida and Puerto Rico.

5. List of Quarantine Pests

The list of quarantine pests for commercial shipments of leaves and tips of snow peas from Dominican Republic is provided in Table 3. Should any of these pests be intercepted on commercial (or any other) shipments of *Pisum sativum* quarantine action may be taken.

Table 3: Quarantine Pests:	
Pathogens	<i>Entyloma</i> sp. <i>Mycovellosiella phaseoli</i> <i>Phomopsis pisicola</i> <i>Septoria papilionacearum</i>
Arthropods	<i>Acalymna bivittatum</i> <i>Cerotoma ruficornis</i> <i>Corythucha gossypii</i> <i>Dedyonchus cinta</i> <i>Disonycha eximia</i> <i>Gryllius assimilis</i> <i>Japanagromyza inaequalis</i> <i>Liriomyza huidobrensis</i> <i>Maruca testulalis</i> <i>Phyllophaga hogardi</i> <i>Prepodes quadrivittatus</i> <i>Systema basalis</i> <i>Systema s-littera</i> <i>Thrips palmi</i>

6. Quarantine Pests Likely to Follow Pathway

Only those quarantine pests that can reasonably be expected to follow the pathway, *i. e.*, be included in commercial shipments of *Pisum sativum*, were analyzed in detail (USDA, 1995). Only quarantine pests listed in Table 4 were selected for further analysis and subjected to steps 7-9 below.

Table 4: Quarantine Pest Selected for Further Analysis:	
Pathogens	<i>Phomopsis pisicola</i> <i>Septoria papilionacearum</i>
Arthropods	<i>Liriomyza huidobrensis</i> <i>Maruca testulalis</i> <i>Thrips palmi</i>

Other plant pests in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States; however, there were a variety of reasons for not subjecting them to further analysis. For example, they are associated mainly with plant parts other than the commodity; they may be associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been

intercepted as biological contaminants of these commodities during inspections by Plant Protection and Quarantine Officers but would not be expected to be present with every shipment. In addition, the biological hazard of organisms identified only to the generic level are not assessed due to the lack of adequate biological/taxonomic information. This lack of biological information on any given insect or pathogen should not be equated with low risk. By necessity, pest risk assessments focus on those organisms for which biological information is available. By developing detailed assessments for known pests that inhabit a variety of niches on the parent species, *i.e.* on the surface of or within the bark/wood, on the foliage, etc., effective mitigation measures can be developed to eliminate the known organism and any similar unknown ones that inhabit the same niches.

7. Economic Importance: Consequences of Introduction

The consequences of introduction were considered for each quarantine pest selected for further analysis. For qualitative, pathway-initiated pest risk assessments, these risks are estimated by rating each pest with respect to five risk elements (USDA, 1995). Table 5 shows the risk ratings for these risk elements.

Table 5: Risk Rating: Consequences of Introduction						
Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Phomopsis pisicola</i>	high	low	low	low	medium	medium
<i>Septoria papilionacearum</i>	high	low	low	low	medium	medium
<i>Liriomyza huidobrensis</i>	high	high	medium	medium	high*	high
<i>Maruca testulalis</i>	high	high	medium	medium	high**	high
<i>Thrips palmi</i>	high	high	medium	medium	high***	high

*This pest is known to attack members of the plant genera, *Trifolium*, *Vicia*, and *Vigna*. In the United States, *Trifolium stoloniferum*, *Vicia menziesii*, and *Vigna o-wahuensis* are Federally listed endangered species.

**This pest is known to attack members of the plant genera, *Canavalia*, *Crotalaria*, *Sesbania*, *Vicia*, and *Vigna*. In the United States, *Canavalia molokaiensis*, *Crotalaria avonensis*, *Sesbania tomentosa*, *Vicia menziesii*, and *Vigna o-wahuensis* are Federally listed endangered species.

***This pest is known to attack members of the plant genera, *Amaranthus*, *Cucurbita*, *Solanum*, and *Vigna*. In the United States, *Amaranthus pumilus*, *Cucurbita okeechobeensis* ssp. *okeechobeensis*, *Solanum drymophilum*, *S. incompletum*, *S. sandwicense*, and *Vigna o-wahuensis* are Federally listed endangered species.

†There are over 200 records of plants on which *T. palmi* has been recorded. The potential impact on endangered or threatened species may be greater than the 6 species listed above.

We believe it would be reasonable to assume that this pest may attack these endangered plants. Because of existing legislation regarding endangered plants, we automatically gave these pests a risk rating of “high” for Consequence of Introduction.

8. Likelihood of Introduction

Each pest is rated with respect to introduction potential, *i.e.*, entry and establishment. Two separate components are considered. First, the amount of commodity likely to be imported is estimated. More imports lead to greater risk; therefore, the risk rating for the quantity of commodity is the same for all quarantine pests considered. Second, five biological features, (risk elements) concerning the pest and

its interactions with the commodity are considered. The resulting risk ratings are specific to each pest. The cumulative risk rating for introduction was considered to be an indicator of the likelihood that a particular pest would be introduced (USDA, 1995). Table 6 shows our ratings for these risk elements.

Table 6: Risk Rating: Likelihood of Introduction							
Pest	Quantity of commodity imported annually	Likelihood survive postharvest treatment	Likelihood survive shipment	Likelihood not detected at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host	Risk rating
<i>Phomopsis pisicola</i>	low	high	high	low	medium	low	medium
<i>Septoria papilionacearum</i>	low	high	high	low	medium	low	medium
<i>Liriomyza huidobrensis</i>	low	high	high	low	medium	medium	medium
<i>Maruca testulalis</i>	low	high	high	low	medium	medium	medium
<i>Thrips palmi</i>	low	high	high	medium	medium	medium	medium

9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The measure of pest risk potential combines the risk ratings for consequences and likelihood of introduction (USDA, 1995). The estimated pest risk potential for each quarantine pest selected for further analysis for the importation of *Pisum sativum* leaves is provided in Table 7.

Table 7: Pest Risk Potential, Quarantine Pests	
Pest	Pest risk potential
<i>Phomopsis pisicola</i>	medium
<i>Septoria papilionacearum</i>	medium
<i>Liriomyza huidobrensis</i>	high
<i>Maruca testulalis</i>	high
<i>Thrips palmi</i>	high

Plant pests with a high Pest Risk Potential may require specific phytosanitary measures. The choice of appropriate sanitary and phytosanitary measures to mitigate risk is undertaken as part of Risk Management and is not addressed, *per se*, in this document.

PPQ has over 2000 plant pest interceptions from peas from other areas; however, virtually all external pests listed could be detected by inspection. Some of these same pests occur in Dominican Republic in addition to other quarantine pests and have been intercepted as hitchhikers with other commodities. Should any of these pests be intercepted on commercial (or any other) shipments of *Pisum sativum* quarantine action may be taken.

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